10.1020

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	:	
Li, Bin	:	Examiner: Rizk, Samir Wadie
Serial No.: 10/046,639	:	Group Art Unit: 2133
Filed: 10/26/2001	:	

For: Optimal Bit Allocation System for Reed-Soloman Coded Data

APPEAL BRIEF

Robert N. Blackmon
Attorney for Appellants

MEREK, BLACKMON & VOORHEES, LLC
673 South Washington Street
Alexandria, Virginia 22314
(703) 684-5633

I. <u>REAL PARTY IN INTEREST</u>

The real party in interest is Ciena Corporation, the assignee of record of the subject patent application.

II. RELATED APPEALS AND INTERFERENCES

Appellants are unaware of any prior or pending appeals, judicial proceedings or interferences which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

Claims1-24 are currently pending and have been finally rejected. Appellants hereby appeal the rejections of Claims 1-24.

IV. STATUS OF AMENDMENTS

No amendment was filed in the subject patent application subsequent to issuance of the Final Rejection on July 18, 2006.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Appellants' invention, as recited in Claim 1, is an iterative method for determining parameters for a forward error correction scheme for improving the quality of a data transmission. (See p.1, lines 16-18, p. 2, line 24 through p. 3, line 4) The method comprises the steps of: (a) establishing a relationship between said parameters and a coding gain (See p. 4, lines 7-25, Fig. 2, reference 202, 204); (b) initializing said coding gain to a minimum predetermined value (See p. 4, lines 26-28, Fig. 2, reference 206); (c) determining, based on said relationship between said parameters and said coding gain, an intermediate set of parameters for providing a preferred result for said coding gain (See p. 5, lines 1-28, Fig. 2, reference 208,210,212); (d) incrementing a value of said coding gain by a predetermined value (See p. 6, lines 9-12, Fig. 2, reference 214) and repeating said step (c) until said coding gain reaches a predefined maximum value, thereby determining a plurality of intermediate sets of parameters (See p. 6, lines 9-12, Fig. 2, block "G >= Gmax"); and (e) determining a preferred set of parameters from said plurality of intermediate sets of parameters, wherein said preferred set of parameters provides said forward error correction scheme with an optimal set of values for balancing a code length and an error rate of said data transmission (See p. 6, lines 13-20, Fig. 2, reference 216)

Appellants' invention, as recited in Claim 10, is to an iterative method for determining parameters for a forward error correction scheme for improving the quality of a data transmission (See p.1, lines 16-18, p. 2, line 24 through p. 3, line 4) The method comprises the steps of: (a) establishing a relationship between said parameters and a coding gain(See p. 4, lines 7-25, Fig. 2, reference 202, 204); (b) initializing said coding gain to a minimum predetermined value(See p. 4, lines 26-28, Fig. 2, reference 206); (c) determining, based on said relationship between said parameters and said coding gain, an intermediate set of parameters for providing a preferred result for said coding gain (See p. 5, lines 1-28, Fig. 2, reference 208,210,212); (d) replacing a preferred set of parameters with said intermediate set of parameters if said intermediate set of parameters provides a better performance, wherein said preferred set of parameters provides said forward error correction scheme with an optimal set of values for balancing a code length and an error rate of said data transmission (See p. 6, lines 13-20 and p. 7, lines 16-24, Fig. 2, reference 302); and (e) incrementing a value of said coding gain by a predetermined value and repeating said steps (c)

and (d) until said coding gain reaches a predefined maximum value (See p. 6, lines 13-20, Fig. 2, reference 214, block “G >= Gmax”)

Appellants’ invention, as recited in Claim 15, is to an apparatus for determining parameters for a forward error correction scheme for improving the quality of a data transmission. (See p. 2, line 24 through p. 3, line 4) The apparatus includes a processor to implement processing including the steps of: (a) establishing a relationship between said parameters and a coding gain (See p. 4, lines 7-25, Fig. 2, reference 202, 204); (b) initializing said coding gain to a minimum predetermined value (See p. 4, lines 26-28, Fig. 2, reference 206); (c) determining, based on said relationship between said parameters and said coding gain, an intermediate set of parameters for providing a preferred result for said coding gain (See p. 5, lines 1-28, Fig. 2, reference 208,210,212); (d) incrementing a value of said coding gain by a predetermined value (See p. 6, lines 9-12, Fig. 2, reference 214) and repeating said step (c) until said coding gain reaches a predefined maximum value, thereby determining a plurality of intermediate sets of parameters (See p. 6, lines 9-12, Fig. 2, block “G >= Gmax”); and (e) determining a preferred set of parameters from said plurality of intermediate sets of parameters, wherein said preferred set of parameters provides said forward error correction scheme with an optimal set of values for balancing a code length and an error rate of said data transmission (See p. 6, lines 13-24, Fig. 2, reference 216,218).

Appellants’ invention, as recited in Claim 16, is to an apparatus for determining parameters for a forward error correction scheme for improving the quality of a data transmission (See p. 2, line 24 through p. 3, line 4) The apparatus includes a processor to implement processing including the steps of: (a) establishing a relationship between said parameters and a coding gain (See p. 4, lines 7-25, Fig. 2, reference 202, 204); (b) initializing said coding gain to a minimum predetermined value (See p. 4, lines 26-28, Fig. 2, reference 206); (c) determining, based on said relationship between said parameters and said coding gain, an intermediate set of parameters for providing a preferred result for said coding gain (See p. 5, lines 1-28, Fig. 2, reference 208,210,212); (d) replacing a preferred set of parameters with said intermediate set of parameters if said intermediate set of parameters provides a better performance, wherein said preferred set of parameters provides said forward error correction scheme with an optimal set of

values for balancing a code length and an error rate of said data transmission(See p. 6, lines 13-20 and p. 7, lines 16-24, Fig. 2, reference 302,218); and (e) incrementing a value of said coding gain by a predetermined value and repeating said steps (c) and (d) until said coding gain reaches a predefined maximum value (See p. 6, lines 9-12, Fig. 2, reference 214 and block "G >= Gmax");

Appellants' invention, as recited in Claim 20, is to an apparatus for determining parameters for a forward error correction scheme for improving the quality of a data transmission. (See p.1, lines 16-18, p. 2, line 24 through p. 3, line 4) The apparatus comprises: first means for establishing a relationship between said parameters and a coding gain(See p. 4, lines 7-25, Fig. 2, reference 202, 204); second means for initializing said coding gain to a minimum predetermined value (See p. 4, lines 26-28, Fig. 2, reference 206); third means for determining, based on said relationship between said parameters and said coding gain, an intermediate set of parameters for providing a preferred result for said coding gain (See p. 5, lines 1-28, Fig. 2, reference 208,210,212); fourth means for incrementing a value of said coding gain by a predetermined value (See p. 6, lines 9-12, Fig. 2, reference 214) and for repeating a function of said third means until said coding gain reaches a predefined maximum value, thereby determining a plurality of intermediate sets of parameters (See p. 6, lines 9-12, Fig. 2, block "G >= Gmax"); and fifth means for determining a preferred set of parameters from said plurality of intermediate sets of parameters, wherein said preferred set of parameters provides said forward error correction scheme with an optimal set of values for balancing a code length and an error rate of said data transmission(See p. 6, lines 13-20, Fig. 2, reference 216).

Applicant's invention as recited in claim 21, is an apparatus for determining parameters for a forward error correction scheme for improving the quality of a data transmission. (See p.1, lines 16-18, p. 2, line 24 through p. 3, line 4) The apparatus comprises: first means for establishing a relationship between said parameters and a coding gain (See p. 4, lines 7-25, Fig. 2, reference 202, 204); second means for initializing said coding gain to a minimum predetermined value (See p. 4, lines 26-28, Fig. 2, reference 206); third means for determining, based on said relationship between said parameters and said coding gain, an intermediate set of parameters for providing a preferred result for said coding gain (See p. 5, lines 1-28, Fig. 2, reference 208,210,212); fourth means for replacing a preferred set of parameters with said intermediate set

of parameters if said intermediate set of parameters provides a better performance, wherein said preferred set of parameters provides said forward error correction scheme with an optimal set of values for balancing a code length and an error rate of said data transmission (See p. 6, lines 13-20 and p. 7, lines 16-24, Fig. 2, reference 302); and fifth means for incrementing a value of said coding gain by a predetermined value and for repeating a function of said third means and a function of said fourth means until said coding gain reaches a predefined maximum value (See p. 6, lines 13-20, Fig. 2, reference 214, block "G >= Gmax").

Applicant's invention of claim 21, and further defined in claim 22, is to an apparatus wherein said third means for determining said intermediate set of parameters comprises: means for calculating a maximum number of bytes per symbol *B* including said coding gain (See p. 5, lines 1-9, Fig. 2, reference 208); means for locating all parameters that satisfy said value of said coding gain (See p. 5, lines 10-19, Fig. 2, reference 210); and means for selecting, as said intermediate set of parameters, and using said maximum number of bytes per symbol *B*, a set of parameters that provides a best performance (See p. 5, lines 20-28, Fig. 2, reference 212).

Applicant's invention of claim 21, and further defined in claim 23, is to an apparatus wherein said third means for determining said intermediate set of parameters comprises: means for calculating a maximum number of bytes per symbol *B* including said coding gain (See p. 5, lines 1-9, Fig. 2, reference 208); and means for selectively skipping said function of said fourth means when a value of said maximum number of bytes per symbol *B* is less than or equal to a previous value of said maximum number of bytes per symbol *B* (See p. 7, lines 16-24, Fig. 2, reference 302)

Applicant's invention of claim 21, and further defined in claim 24, is to an apparatus wherein said third means for determining said intermediate set of parameters comprises: means for calculating a maximum number of bytes per symbol *B* including said coding gain (See p. 5, lines 1-9, Fig. 2, reference 208); and means for selectively skipping said function of said fourth means and a function of said fifth means when a value of said maximum number of bytes per symbol *B* is less than or equal to a previous value of said maximum number of bytes per symbol *B* (See p. 7, line 25 through p.8, line 11, Fig. 2, reference 302)

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The following grounds of rejection are to be reviewed in the subject appeal:

(1) Whether Claims 1-24 are anticipated under 35 U.S.C. 102 (b) by U.S. Patent No. 6,598,188 ("Locke et al.").

VII. <u>ARGUMENT</u>

THE REJECTION OF CLAIMS 1 THROUGH 24 UNDER 35 USC 102 (b) IS ERRONEOUS

"Anticipation…requires that the *identical invention that is claimed* was previously known to others and thus is not new…*When more than one reference is required to establish unpatentability of the claimed invention anticipation under § 102 can not be found*, and validity is determined in terms of § 103." *Continental Can v. Monsanto,* 948 F.2d 1264, 1267 (Fed. Cir. 1991)(emphasis added).

"A patent is invalid for anticipation *when the same device or method, having all the elements and limitations contained in the claims*, is described in a single prior art reference." *ATD Corporation v. Lydall, Inc.*, 159 F.3d 534, 545 (Fed. Cir. 1998)(emphasis added). See also *Crown Operations International, Ltd. v. Krone*, 289 F.3d 1367, 1375 (Fed. Cir. 2002)

The single reference must have an enabling disclosure. See *Advanced Display Systems Inc. v. Kent State University*, 54 USPQ 2d 1673, 1679 (Fed. Cir. 2000)("Accordingly, invalidity by anticipation requires that the four corners of *a single, prior art document* describe every element of the claimed invention, expressly or inherently, such that *a person of ordinary skill in the art could practice the invention without undue experimentation*.")(emphasis added); See also, *PPG Industries, Inc. v. Guardian Industries Corp.*, 37 USPQ 2d 1618, 1624 (Fed. Cir. 1996)("To anticipate a claim, a reference must disclose every element of the challenged claim and *enable one skilled in the art to make the anticipating subject matter*.")(emphasis added)

"To serve as an anticipation when the reference is silent about the asserted inherent characteristic, such gap in the reference may be filled with recourse to extrinsic evidence. *Such evidence must make clear that the missing descriptive matter is necessarily present* in the thing

described in the reference, and that it would be so recognized by persons of ordinary skill." *Continental Can,* 948 F.2d at 1268. (emphasis added)

"*Inherency, however, may not be established by probabilities or possibilities.* The mere fact that a certain thing may result from a given set of circumstances is not sufficient." *In re Oelrich,* 666 F.2d 578, 581, 212 USPQ 323, 326 (CCPA 1981)(emphasis added). See also, *Continental Can,* 948 F.2d at 1269.

"[T]he initial burden of establishing a *prima facie* basis to deny patentability to a claimed invention rests upon the examiner…In relying upon inherency, *the examiner must* provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic *necessarily* flows from the teachings of the applied prior art." *Ex parte Levy,* 17 USPQ 2d 1461, 1464 (BPAI 1990)(emphasis in original)

Evaluated under these controlling legal standards, the rejections of Claims 1 through 24 under 35 USC § 102 based on Locke et al. cannot be sustained.

1. Claims 1-24 are not anticipated by Locke et al.

.The present invention is to an improved method for dynamically selecting error correction parameters by establishing a relationship between the FEC parameters and a coding gain ("An iterative method for determining parameters for a forward error correction scheme for improving the quality of a data transmission."). Coding gain is defined in the application as referring to the "difference in power that the non-error correcting system would require to transmit data of a specified bit error rate as compared to the power required by the error correcting system." ¶[21] It is important to balance the coding gains with the increase in overhead losses caused by large code-word lengths ("n") and redundant lengths ("r"). Further, error code parameters can be

affected by the signal to noise ration of the transmission environment. The claim recites the invention as first "(a) establishing a relationship between said parameters and a coding gain." The coding gain is then set to a minimum predetermined value ("(b) initializing said coding gain to a minimum predetermined value."). The parameters including N, R are then determined, that can provide the coding gain ("(c) determining, based on said relationship between said parameters and said coding gain, an intermediate set of parameters for providing a preferred result for said coding gain."). The coding gain is then incremented and the process is repeated until the maximum coding gain is reached ("(d) incrementing a value of said coding gain by a predetermined value and repeating said step (c) until said coding gain reaches a predefined maximum value, thereby determining a plurality of intermediate sets of parameters.") The maximum bytes per symbol is then determined for all incremental coding gains by either establishing all of the calculate local maximum bytes per symbol ("determining a preferred set of parameters from said plurality of intermediate sets of parameters, wherein said preferred set of parameters provides said forward error correction scheme with an optimal set of values for balancing a code length and an error rate of said data transmission." Claims 1, 15, 20) or by continuously comparing local maximum bytes per symbol to a previously calculated maximum ("replacing a preferred set of parameters with said intermediate set of parameters if said intermediate set of parameters provides a better performance, wherein said preferred set of parameters provides said forward error correction scheme with an optimal set of values for balancing a code length and an error rate of said data transmission." Claims 10, 16, 22). Various permutations on this process and additional steps are provided in the claims drawn to various embodiments of the invention.

The Examiner has applied Locke et al. to the claims as anticipating each and every element of claims 1-24. The applicant respectfully traverses this finding. Locke et al. shows a method of

maximizing error-corrected data rate, but does so using an entirely different method and does not suggest the claims of the current invention. Nowhere in the patent does Locke et al. mention or teach the use of "coding gain" or transmission power as a variable or a key in determining the maximum transmission rate. Specifically, Locke does not show “establishing a relationship between said parameters and a coding gain.” Nor does Locke show “initializing said coding gain to a minimum predetermined value.” Locke also does not show “determining, based on said relationship between said parameters and said coding gain, an intermediate set of parameters for providing a preferred result for said coding gain.” Locke further does not show “incrementing a value of said coding gain by a predetermined value and repeating said step (c) until said coding gain reaches a predefined maximum value, thereby determining a plurality of intermediate sets of parameters.”

Locke et al. merely shows data rate as affected by the Reed-Solomon parity bytes required to meet the maximum-allowed corrected bit error rate by selection of codeword configuration. The process merely determines the minimum number of Reed-Soloman parity bytes required for acceptable reception, and computes the resultant data rate and keeps track of the maximum ("highest") data rate. Nowhere does Locke et al. determine the coding gain or use the coding gain to determine code-word length and redundant length, therefore the steps recited in the present claims are not met, namely: (a) establishing a relationship between said parameters and a coding gain; (b) initializing said coding gain to a minimum predetermined value; (c) determining, based on said relationship between said parameters and said coding gain, an intermediate set of parameters for providing a preferred result for said coding gain.

The Examiner alleges that Locke et al. explicitly "teaches the iterative method of changing the coding gain as one of the parameters for optimal codeword selection in the disclosed algorithm in col. 5, lines (10-12)." Page 2, paragraph 2 of Final Office Action dated 7/18/2006. The Examiner points to a single comment in the program coding, which states that "It might also be possible to adjust the coding gain for this factor." (Col. 5, lines 11-13) The Applicant respectfully submits that this simple hypothetical does not place the invention in the possession of the public domain and thus is not sufficient grounds to anticipate the present invention, as the reference does not in any way enablingly teach the invention. See MPEP 2121.01. "The single reference must have an enabling disclosure." See Advanced Display Systems Inc. v. Kent State University, 54 USPQ 2d 1673, 1679 (Fed. Cir. 2000)("Accordingly, invalidity by anticipation requires that the four comers of a single, prior art document describe every element of the claimed invention, expressly or inherently, such that a person of ordinary skill in the art could practice the invention without undue experimentation.")(emphasis added); See also, PPG Industries, Inc. v. Guardian Industries Corp., 37 USPQ 2d 1618, 1624 (Fed. Cir. 1996)("To anticipate a claim, a reference must disclose every element of the challenged claim and enable one skilled in the art to make the anticipating subject matter.")

"It is well settled that prior art under 35 U.S.C. § 102 (b) must sufficiently describe the claimed invention to have placed the public in possession of it. In re Sasse, 629 F.2d 675, 681, 207 U.S.P.Q. (BNA) 107, 111 (CCPA 1980); In re Samour, 571 F.2d at 562, 197 U.S.P.Q. at 4; see also Reading & Bates Construction Co. v. Baker Energy Resources Corp., 748 F.2d 645, 651-52, 223 U.S.P.Q. (BNA) 1168, 1173 (Fed. Cir.1984). Such possession is effected if one of ordinary skill in the art could have combined the publication's description of the invention with his own knowledge to make the claimed invention. See In re LeGrice, 301 F.2d at 939, 133 U.S.P.Q. at 373-74. Accordingly, even if the claimed invention is disclosed in a printed publication, that

disclosure will not suffice as prior art if it was not enabling. In re Borst, 52 C.C.P.A. 1398, 345 F.2d 851, 855, 145 U.S.P.Q. (BNA) 554, 557 (1965), cert, denied, 382 U.S. 973, 83 S. Ct. 537, 15 L. Ed. 2d 465 (1966). It is not, however, necessary that an invention disclosed in a publication shall have actually been made in order to satisfy the enablement requirement." In re John A. Donohue, 766 F.2d 531, 533, 226 U.S.P.Q. 619 (Fed. Cir. 1985)

"Invalidity based on anticipation requires that the assertedly anticipating disclosure enabled the subject matter of the reference without undue experimentation." Elan Pharmaceuticals, Inc. and Athena Neurosciences, Inc. v. Mayo Foundation for Medical Education and Research, 346 F.3d 1051, 68 U.S.P.Q.2d 1373 (Fed. Cir. 2003) To serve as an anticipating reference, the reference must enable that which it is asserted to anticipate. Id at 1054. "The issue is whether [the reference's] teachings enabled a person of ordinary skill, without undue experimentation, to produce the desired [invention]." Id. at 1057. 'To anticipate the reference must also enable one of skill in the art to make and use the claimed invention." Bristol-Myers Squibb v. Ben Venue Laboratories, Inc. 246 F.3d 1368,1374, 58 U.S.P.Q. 1508,1512 (Fed. Cir. 2001)

"A reference contains an 'enabling disclosure' if the public was in possession of the claimed invention before the date of invention." MPEP 2121.01. In the present instance, there is no enabling disclosure of using coding gain for dynamically selecting error correction parameters by establishing a relationship between the FEC parameters and a coding gain. Locke does not even teach that adjusting the coding gain "is" possible or desired, only that it "might" be possible. This does not satisfy the requirement of enablingly disclosing an invention. Obviously, if it were a simple matter, Locke would have taught such an alternative embodiment with sufficient details for one of ordinary skill in the art to make such a version. However, this simple

statement that it "might" be possible is non-enabling as it does not teach one of ordinary skill in the art how to produce such a device without undue experiment. Tellingly, Locke does not refer to this line of code in the detailed description in any way. Further, Locke does not teach how the coding gain could be adjusted or for what reason. Nor does Locke teach that the coding gain would need to be adjusted for any other reason than to adjust for the trellis coding. There is also no teaching "why" such an embodiment might be desirable either or how it would fit in with the embodiment described by Locke. And there is no teaching that the coding gain be set to a minimum predetermined value and thereafter incremented. Therefore, Locke et al. cannot explicitly or implicitly teach the claimed inventions within the “four corners” of the Locke et al. reference. Additionally, merely setting forth a program without further explanation fails to meet even the § 112 minimum requirements to enablingly disclose an invention, “The requirements for sufficient disclosure of inventions involving computer programming are the same as for all inventions sought to be patented. Namely, there must be an adequate written description, the original disclosure should be sufficiently enabling to allow one to make and use the invention as claimed, and there must be presentation of a best mode for carrying out the invention.” MPEP 2161.01. Certainly there is no best mode or any description of the program that would allow one of ordinary skill to appreciate the alleged teaching without undue experimentation, especially considering that there is neither programming code listing how such is to be performed nor flow diagrams nor textual description of the alleged teaching. The mere fact that a concept may be touched upon in a publication is not sufficient, the teaching must be enabling. See <u>In re Borst</u> at 855 (“Accordingly, even if the claimed invention is disclosed in a printed publication, that disclosure will not suffice as prior art if it was not enabling.”)

The Examiner also alleges that "transmitter power" is listed as a "parameter" at Col. 4, lines 3-6. Locke states "Of course, p depends upon the transmitter power, noise power, and bit

rate (constellation density); and channel analysis essentially estimates p." However, Locke does not explicitly or implicitly teach that transmitter power is a variable that should be "set to a minimum predetermined value" and then "incrementally increased" and "repeated until maximum coding gain is reached." Locke merely recognizes that there is a relation between p and coding gain. Locke does not use the transmission power as a variable in *determining* the maximum transmission rate; Locke merely recognizes that the variable p depends in part upon the transmission power. Locke certainly does not enablingly teach the iterative method of changing the coding again as one of the parameters for optimal codeword selection in the disclosed algorithm in col. 5, lines (10-12) See above.

The Examiner's provided definition of coding gain as an industry standard does not provide the elements missing in Locke, namely that the present invention is to an improved method for dynamically selecting error correction parameters by establishing a relationship between the FEC parameters and a coding gain. In fact, in the specification and in the previous response, Applicant has maintained that coding gain is the "difference in power that the non-error correcting system would require to transmit data of a specified bit error rate as compared to the power required by the error correcting system." ¶21 Locke et al. merely shows data rate as affected by the Reed-Solomon parity bytes required to meet the maximum-allowed corrected bit error rate by selection of codeword configuration. Nowhere in the patent does Locke et al. mention or teach the use of "coding gain" or transmission power as a variable or a key in determining the maximum transmission rate.

For at least these reasons, the 102 rejection must fail, and the claims 1-24 should be allowed over the art of record.

CONCLUSION

When evaluated under the controlling legal standards, the Examiner's rejections of Claims 1-24 cannot be sustained. Hence, Appellants respectfully request that all grounds of rejection be reversed.

A check in the amount of $ 500 is attached hereto to satisfy the government fee for filing the subject appeal brief. It is believed that no additional fees are due. However, should that determination be incorrect, the Commissioner is hereby authorized to charge any deficiencies to Deposit Account No. 50-0562 and notify the undersigned in due course.

Respectfully submitted,

Date: March 18, 2007

/Robert N. Blackmon/
Robert N. Blackmon
Attorney for Appellants
Reg. No. 39494

MEREK, BLACKMON & VOORHEES, LLC
673 South Washington Street
Alexandria, Virginia 22314
(703) 684-5633

VIII. CLAIMS APPENDIX

1. An iterative method for determining parameters for a forward error correction scheme for improving the quality of a data transmission, said method comprising the steps of:

(a) establishing a relationship between said parameters and a coding gain;

(b) initializing said coding gain to a minimum predetermined value;

(c) determining, based on said relationship between said parameters and said coding gain, an intermediate set of parameters for providing a preferred result for said coding gain;

(d) incrementing a value of said coding gain by a predetermined value and repeating said step (c) until said coding gain reaches a predefined maximum value, thereby determining a plurality of intermediate sets of parameters; and

(e) determining a preferred set of parameters from said plurality of intermediate sets of parameters, wherein said preferred set of parameters provides said forward error correction scheme with an optimal set of values for balancing a code length and an error rate of said data transmission.

2. A method as defined in claim 1, wherein said step (a) of establishing said relationship between said parameters and said coding gain comprises:

(a1) calculating said coding gain for a plurality of associated parameters; and

(a2) storing results of said step (a1) in a table.

3. A method as defined in claim 1, wherein said step (a) of establishing said relationship between said parameters and said coding gain comprises:

(a1) calculating said coding gain for a plurality of associated parameters; and

(a2) determining an equation that approximates all results from said step (a1).

4. A method as defined in claim 1, wherein said step (c) of determining said intermediate set of parameters comprises:

calculating a maximum number of bytes per symbol B including said coding gain;

locating all parameters that satisfy said value of said coding gain; and

selecting, as said intermediate set of parameters, and using said maximum number of bytes per symbol B, a set of parameters that provides a best performance.

5. A method as defined in claim 4, wherein said best performance is defined by said set of parameters that yields a largest number of information bytes.

6. A method as defined in claim 1, wherein said step (e) of determining said preferred set of parameters comprises:

3comparing all of said plurality of intermediate sets of parameters; and

selecting as said preferred set of parameters said intermediate set of parameters that provides a best performance.

7. A method as defined in claim 6, wherein said best performance is defined by said set of parameters that yields a largest number of information bytes.

8. A method as defined in claim 7, wherein said largest number of information bytes is compared with a maximum number of bytes B_0 had said forward error correction scheme not been implemented, for determining whether to use said forward error correction scheme.

9. A method as defined in claim 1, wherein said step (c) of determining said intermediate set of parameters is further based on external factors, wherein said external factors include delay and noise protection.

10. An iterative method for determining parameters for a forward error correction scheme for improving the quality of a data transmission, said method comprising the steps of:

(a) establishing a relationship between said parameters and a coding gain;

(b) initializing said coding gain to a minimum predetermined value;

(c) determining, based on said relationship between said parameters and said coding gain, an intermediate set of parameters for providing a preferred result for said coding gain;

(d) replacing a preferred set of parameters with said intermediate set of parameters if said intermediate set of parameters provides a better performance, wherein said preferred set of parameters provides said forward error correction scheme with an optimal set of values for balancing a code length and an error rate of said data transmission; and

(e) incrementing a value of said coding gain by a predetermined value and repeating said steps (c) and (d) until said coding gain reaches a predefined maximum value.

11. A method as defined in claim 10, wherein said better performance is defined as a set of parameters yielding a larger number of information bytes.

12. A method as defined in claim 10, wherein said step (c) of determining said intermediate set of parameters comprises:

calculating a maximum number of bytes per symbol B including said coding gain;

locating all parameters that satisfy said value of said coding gain; and

selecting, as said intermediate set of parameters, and using said maximum number of bytes per symbol B, a set of parameters that provides a best performance.

13. A method as defined in claim 10, wherein said step (c) of determining said intermediate set of parameters comprises:

calculating a maximum number of bytes per symbol B including said coding gain; and

selectively skipping said step (d) when a value of said maximum number of bytes per symbol B is less than or equal to a previous value of said maximum number of bytes per symbol B.

14. A method as defined in claim 10, wherein said step (c) of determining said intermediate set of parameters comprises:

calculating a maximum number of bytes per symbol B including said coding gain;

selectively skipping said steps (d) and (e) when a value of said maximum number of bytes per symbol B is less than or equal to a previous value of said maximum number of bytes per symbol B.

15. An apparatus for determining parameters for a forward error correction scheme for improving the quality of a data transmission, said apparatus including a processor to implement processing including the steps of:

(a) establishing a relationship between said parameters and a coding gain;

(b) initializing said coding gain to a minimum predetermined value;

(c) determining, based on said relationship between said parameters and said coding gain, an intermediate set of parameters for providing a preferred result for said coding gain;

(d) incrementing a value of said coding gain by a predetermined value and repeating said step (c) until said coding gain reaches a predefined maximum value, thereby determining a plurality of intermediate sets of parameters; and

(e) determining a preferred set of parameters from said plurality of intermediate sets of parameters, wherein said preferred set of parameters provides said forward error correction scheme with an optimal set of values for balancing a code length and an error rate of said data transmission.

16. An apparatus for determining parameters for a forward error correction scheme for improving the quality of a data transmission, said apparatus including a processor to implement processing including the steps of:

(a) establishing a relationship between said parameters and a coding gain;

(b) initializing said coding gain to a minimum predetermined value;

(c) determining, based on said relationship between said parameters and said coding gain, an intermediate set of parameters for providing a preferred result for said coding gain;

(d) replacing a preferred set of parameters with said intermediate set of parameters if said intermediate set of parameters provides a better performance, wherein said preferred set of parameters provides said forward error correction scheme with an optimal set of values for balancing a code length and an error rate of said data transmission; and

(e) incrementing a value of said coding gain by a predetermined value and repeating said steps (c) and (d) until said coding gain reaches a predefined maximum value.

17. An apparatus as defined in claim 16, wherein said step (c) of determining said intermediate set of parameters comprises:

calculating a maximum number of bytes per symbol B including said coding gain;

locating all parameters that satisfy said value of said coding gain; and

selecting, as said intermediate set of parameters, and using said maximum number of bytes per symbol B, a set of parameters that provides a best performance.

18. An apparatus as defined in claim 16, wherein said step (c) of determining said intermediate set of parameters comprises:

calculating a maximum number of bytes per symbol B including said coding gain; and

selectively skipping said step (d) when a value of said maximum number of bytes per symbol B is less than or equal to a previous value of said maximum number of bytes per symbol B.

19. An apparatus as defined in claim 16, wherein said step (c) of determining said intermediate set of parameters comprises:

calculating a maximum number of bytes per symbol B including said coding gain; and

selectively skipping said steps (d) and (e) when a value of said maximum number of bytes per symbol B is less than or equal to a previous value of said maximum number of bytes per symbol B.

20. An apparatus for determining parameters for a forward error correction scheme for improving the quality of a data transmission, comprising:

first means for establishing a relationship between said parameters and a coding gain;

second means for initializing said coding gain to a minimum predetermined value;

third means for determining, based on said relationship between said parameters and said coding gain, an intermediate set of parameters for providing a preferred result for said coding gain;

fourth means for incrementing a value of said coding gain by a predetermined value and for repeating a function of said third means until said coding gain reaches a predefined maximum value, thereby determining a plurality of intermediate sets of parameters; and

fifth means for determining a preferred set of parameters from said plurality of intermediate sets of parameters, wherein said preferred set of parameters provides said forward error correction scheme with an optimal set of values for balancing a code length and an error rate of said data transmission.

21. An apparatus for determining parameters for a forward error correction scheme for improving the quality of a data transmission, comprising:

first means for establishing a relationship between said parameters and a coding gain;

second means for initializing said coding gain to a minimum predetermined value;

third means for determining, based on said relationship between said parameters and said coding gain, an intermediate set of parameters for providing a preferred result for said coding gain;

fourth means for replacing a preferred set of parameters with said intermediate set of parameters if said intermediate set of parameters provides a better performance, wherein said preferred set of parameters provides said forward error correction scheme with an optimal set of values for balancing a code length and an error rate of said data transmission; and

fifth means for incrementing a value of said coding gain by a predetermined value and for repeating a function of said third means and a function of said fourth means until said coding gain reaches a predefined maximum value.

22. An apparatus as defined in claim 21, wherein said third means for determining said intermediate set of parameters comprises:

means for calculating a maximum number of bytes per symbol B including said coding gain;

means for locating all parameters that satisfy said value of said coding gain; and

means for selecting, as said intermediate set of parameters, and using said maximum number of bytes per symbol B, a set of parameters that provides a best performance.

23. An apparatus as defined in claim 21, wherein said third means for determining said intermediate set of parameters comprises:

means for calculating a maximum number of bytes per symbol B including said coding gain; and

means for selectively skipping said function of said fourth means when a value of said maximum number of bytes per symbol B is less than or equal to a previous value of said maximum number of bytes per symbol B.

24. An apparatus as defined in claim 21, wherein said third means for determining said intermediate set of parameters comprises:

means for calculating a maximum number of bytes per symbol B including said coding gain; and

means for selectively skipping said function of said fourth means and a function of said fifth means when a value of said maximum number of bytes per symbol B is less than or equal to a previous value of said maximum number of bytes per symbol B.

IX. EVIDENCE APPENDIX

None.

X. RELATED PROCEEDINGS APPENDIX

None.